

Remarks

Upon entry of the present Reply, claims 1-24 are pending in the present application. Claim 1 is amended to address the objection under Section 112, 2nd Paragraph. No other claims are amended.

Rejections of Claims over Clothier et al. in view of Asai**And Tertiary References.**

Claims 1, 10, 12-14, 21 and 24 stand rejected as obvious over Clothier et al., US 2002/0177006 in view of Asai et al., US 6240636. Claims 2-11, 15 and 18-22 stand rejected over Clothier and Asai, and further in view of Tamm, US 5666722. Claim 16 stands rejected over Clothier and Asai, and further in view of Konrad, US 2002/0129972. Claim 17 stands rejected over Clothier and Asai, and further in view of Yokogawa, US 6740416. Claim 23 stands rejected over Clothier and Asai, and further in view of Frank, US 5577309. Applicant respectfully traverses these rejections of the claims, and requests reconsideration and withdrawal of said rejections, for at least the following reasons.

Applicant respectfully submits that the references fail to disclose or suggest all of the features of claim 1 of the present application. Accordingly, there is no basis for a *prima facie* case of obviousness, and the rejections of Applicant's claims should be withdrawn.

Regarding claim 1, the Office Action contended that Clothier discloses a process and structure as claimed, but admits (middle of page 3) that Clothier fails to disclose providing a PCB having circuit traces on at least one side thereof, fails to disclose structuring the dielectric layer for producing vias, and fails to disclose the vias extending through the dielectric layer to the circuit traces. The Office Action contended that Asai makes up for these deficiencies, in that it discloses in Fig. 1 providing a PCB with circuit traces 3 on at least one side thereof and structuring the dielectric layer for producing vias 5 using laser ablation and the vias 5 extending through the dielectric layer to the circuit traces. Based on this, the Office Action concluded that it would have been obvious to apply Asai's process to Clothier.

Applicant respectfully disagrees for several reasons.

Clothier discloses, in Fig. 2A-2E, a foil 1 on which a conductive layer 2, e.g.,

of copper, is formed. A dielectric layer 3 is formed on the conductive layer 2, and shaped to form circuit features 4. A conductive material 5 is applied over the shaped dielectric layer, optionally preceded by a seed layer [0045, not shown]. The plated conductive material 5 is then planarized with CMP to form the high density circuitry structure 10. While this might possibly be construed to show forming trenches and filling them, it is only part of what Clothier discloses. Following these initial steps, as shown in Figs. 2F-2O, two of the structures 10 are sandwiched together with a dielectric layer 6 between them to form a two-layer structure 22. Then, as shown in Figs. 2M-2O, vias are formed all the way through to the circuit traces.

Thus, Applicant respectfully submits that the Office Action has proven too much. Since Clothier clearly intends only to form vias that extend all the way through, it makes no sense to selectively stop the process of Clothier at an incomplete, initial point, and then somehow combine this with the teachings of Asai. This modification is not something the skilled person would do; rather Applicant respectfully submits it is only something a patent examiner would do in an exercise of improper hindsight.

Asai does more than simply start with a PCB with circuit traces on it, apply a dielectric and then structure the dielectric for producing vias. Rather, Asai starts with a PCB having circuit traces 3, a dielectric layer 2, a copper foil layer 1 on the dielectric 2 and a supporting member 10 on the copper foil layer 1. Asai removes the supporting member, cuts through both the copper foil layer 1 and the dielectric 2 to reach the circuit traces 3, and then fills this. There is nothing in Asai to suggest that trenches not reaching the circuit traces might be added or used with the Asai teachings.

In sum, there is nothing whatsoever in either of Clothier or Asai to suggest the claimed process of forming both trenches and vias, in which the trenches do not extend to the circuit traces while at the same time the vias do extend to the circuit traces, as claimed. While there may arguably be a point in Clothier at which there are trenches not extending to the circuit traces, there is nothing to suggest stopping at this point in some cases while proceeding to form vias that do connect to the circuit traces in other cases. Similarly, in Asai, there is nothing to suggest that,

rather than forming vias that extend to the circuit traces, one should stop in some cases and form only trenches in other cases.

For the foregoing reasons, Applicant respectfully submits that the presently claimed invention of claim 1 and of the claims dependent thereon would not have been obvious over Clothier in view of Asai. Applicant respectfully submits that the references fail to disclose or suggest all of the features of claim 1 and of the claims dependent thereon of the present application. Accordingly, there is no basis for a *prima facie* case of obviousness, and the rejections of Applicant's claims should be withdrawn.

Applicant respectfully submits that, when comparing the present invention with the methods disclosed by Clothier et al. and Asai et al., there is another remarkable difference to be considered, and that the Office action failed to do so. Having so failed, for this additional reason, Applicant respectfully submits that the references fail to disclose or suggest all of the features of claim 1 and of the claims dependent thereon of the present application. Accordingly, there is no basis for a *prima facie* case of obviousness, and the rejections of Applicant's claims should be withdrawn.

The Office action alleges that it would have been obvious to one of ordinary skill in the art to utilize in Clothier et al., providing a PCB having circuit traces on at least one side thereof; structuring the dielectric layer for producing vias; and the vias extending through the dielectric layer to the circuit traces, as taught by Asai et al.

In order to come to this conclusion, Applicant submits that a person skilled in the art would have to replace some item used in the Clothier et al. method by the PCB of Asai et al., and then structure the dielectric layer of Clothier et al. for producing the vias extending through to the circuit traces. Such item to be replaced could only be the carrier 1 and conductive layer 2 of Clothier et al. onto which the dielectric 3 is applied.

The Office action failed to note, however, the specific function of the carrier foil 1 and conductive layer 2 of Clothier et al., to which then the dielectric material 3 is applied, which in turn is structured and finally filled with conductive material 5:

If a person skilled in the art would – as the Office action contends – provide the PCB having circuit traces on at least one side thereof of Asai et al., and structure the dielectric layer for producing vias such that the vias extend through the dielectric layer to the circuit traces, as Asai et al. teach, this person would, to combine the two references, require in the other (Clothier et al.) reference a process which comprises starting with a base material which could be replaced by the PCB of Asai et al. In order to be replaced by the PCB of Asai et al., the respective base material of this other reference would have to become a functional entity of the final circuit carrier to be produced since Asai et al. teach to have the PCB (wiring pattern 3) being a functional entity of the final circuit carrier. And so does the present invention.

This could not be done.

But in fact, Clothier et al. start with a base material (carrier foil 1 and conductive layer 2) which would not be replaced by the PCB of Asai et al. because this base material is removed prior to finishing the final circuitry in the method of Clothier et al. The base material of Clothier et al. simply helps manufacturing the circuitry structure (temporarily impart the elements thereof mechanical stability) and therefore will not be integral part of the final structure: Clothier et al. start with a carrier foil made of copper which carries a conductive layer, made of chromium. This ensemble is removed in the method step from Fig. 2F to Fig. 2G and is no longer used in the subsequently produced circuitry structure. By contrast, the PCB of Asai et al. will form an integral part of the final printed circuit board.

Thus, in order to combine these references, such a fundamental change would be necessary in Clothier et al. that it would completely alter the basic function of the teachings of the reference, and such extreme modification, to the point of destroying the function of the inventions disclosed in the references, is not proper for any obviousness analysis. Such a major modification would not have been obvious to a person of ordinary skill in the art, and thus the contended result of this modification would not have been obvious, either.

Therefore, for this additional reason, the two references, Clothier et al. and Asai et al., do not suggest the combination of the method as claimed.

For the foregoing additional reasons, Applicant respectfully submits that the presently claimed invention of claim 1 and of the claims dependent thereon would

not have been obvious over Clothier in view of Asai. Applicant respectfully submits that the references fail to disclose or suggest all of the features of claim 1 and of the claims dependent thereon of the present application. Accordingly, there is no basis for a *prima facie* case of obviousness, and the rejections of Applicant's claims should be withdrawn.

Rejection for Indefiniteness

In the Office Action, claims 1-21 stand rejected as indefinite, based on the allegation that in claim 1, there is not sufficient basis for "the circuit board" in step (b), since in step (a), a printed circuit board is introduced. Applicant has amended claim 1 to address this rejection, but respectfully submits that there was no indefiniteness, since a circuit board clearly was introduced, and "printed" merely describes the circuit board. Thus, there was no indefiniteness about which circuit board this was.

CONCLUSION

Claims 1-24 are believed to be in condition for allowance. Notice to such effect is respectfully requested.

In the event any issues remain in the application, or if the Examiner considers that a telephone interview would facilitate the examination process, Applicant's undersigned attorney invites the Examiner to telephone him at the Examiner's convenience.

The fee for two additional total claims is submitted herewith. In the event any other additional fees are due in connection with the filing of this document, the Commissioner is authorized to charge those fees to our Deposit Account No. 18-0988 under Attorney Docket No. **EFFE0101US**.

Respectfully submitted,
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